REMARKS

This Amendment is responsive to the Office Action dated November 5, 2010. Applicant has amended claims 1, 20, 39, 56, 64, and 80–82, and added new claims 87 and 88. Claims 1–88 will be pending upon entry of this Amendment.

Allowable Subject Matter

In the Office Action, the Examiner objected to claim 37 as including subject matter that would be allowable if rewritten in independent form. Applicant thanks the Examiner for the indication of allowable subject matter, but respectfully declines to rewrite claim 37 into independent form at this time.

Claim Rejection Under 35 U.S.C. § 103

In the Office Action, claims 1–36 and 38–86 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chapoulaud et al. (U.S. Patent Application Publication No. 2002/0028417, hereinafter "Chapoulaud") in view of Fujita et al. (U.S. Patent No. 5,712,965, hereinafter "Fujita"). In addition, claims 29, 30, 65–67, and 79 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chapoulaud in view of Fujita, and further in view of Kopelman et al. (U.S. Patent Application Publication No. 2003/014509, hereinafter "Kopelman"). Applicant respectfully traverses the rejection of the claims. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and there would have been no apparent reason for modification to arrive at Applicant' claimed invention.

For example, Chapoulaud in view of Fujita fails to disclose or suggest a method that comprises displaying, via a user interface of a computing device, a three-dimensional (3D) digital representation of a tooth of a dental arch within a 3D environment, and, while displaying the digital representation of the tooth of the dental arch, displaying, via the user interface, a two-dimensional (2D) planar guide within the 3D environment as a visual aid to a practitioner in the placement of an orthodontic appliance relative to the tooth of the dental arch within the 3D environment, where the 2D planar guide is displayed separately from the digital representation of the tooth, and where displaying the planar guide comprises, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location that is based on at least one of a position or an orientation of the orthodontic

appliance within the 3D environment, as recited by Applicant's independent claim 1, as amended.

In support of the rejection of claim 1, the Office Action acknowledged that Chapoulaud does not disclose a 2D planar guide or displaying a 2D planar guide in accordance with the method of Applicant's claim 1. The Office Action cited Fujita in an attempt to overcome this deficiency in Chapoulaud. The Office Action asserted that each face of the rectangular parallelepiped disclosed by Fujita is a 2D planar guide, and asserted that Fujita, at column 5, line 63 to column 6, line 59, and column 17, line 3 to column 18, line 33, discloses a method in which each face of the rectangular parallelepiped is "rendered at a location that is based on a position of the 3D object within the 3D environment."[1] The Office Action asserted that "it would have been obvious to one having ordinary skill in the art to modify the method, system, and medium of Chapoulaud use [sic] the method of manipulating 3D objects as taught by Fujita to manipulate the orthodontic appliance of Chapoulaud in order to improve operability as taught by Fujita (column 6, lines 27-36)."[2]

Applicant respectfully disagrees that Fujita cures the fundamental deficiencies in Chapoulaud. Therefore, even if Chapoulaud was modified in view of Fujita, the resulting method would not include each and every element of Applicant's independent claim 1.

A method disclosed by Fujita includes displaying a contour of a rectangular parallelepiped that circumscribes a solid object.[3] FIGS. 17A–17C (reproduced below) of Fujita each illustrates a rectangular parallelepiped that circumscribes a solid object (shown to have a pyramid shape in FIGS. 17A–17C).

[1] Office Action dated November 5, 2010, page 3, item 5.
[2] *Id.* at page 3, item 6.
[3] Fujita, col. 4, ll. 65–67

Fig.17A

Fig.17B

Fig.17C

In the portions of Fujita cited in the Office Action, Fujita discloses a technique in which a point on the rectangular parallelepiped is selected, and then an edit operation is performed on the selected point of the parallelepiped, rather than directly on the object the parallelepiped circumscribes.[4] For example, Fujita discloses that in order to rotate the object the rectangular parallelepiped circumscribes, "a point on a side of the circumscribed rectangular parallelepiped is specified and a cursor is dragged using an input means."[5] The order in which the parallelepiped and object are moved is shown by FIGS. 17A–17C of Fujita (reproduced above). In FIG. 17A, the rectangular parallelepiped and object are in an initial position. As FIG. 17B illustrates, the rectangular parallelepiped is first rotated (e.g., based on movement of a computer mouse[6]), and, as shown in FIG. 17C, the solid object is subsequently moved. As another example, Fujita states that when translating a solid object is selected as an edit operation, a side of the rectangular parallelepiped is selected and a cursor is dragged in a predetermined direction of translation, which appears to correspond to the planar direction of the side of the rectangular parallelepiped selected by a user.[7] Thus, in Fujita, a user provides input directly moving the rectangular parallelepiped, and an object is subsequently moved based on the edit operation performed on the rectangular parallelepiped.

In contrast, the method of Applicant's claim 1 requires, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the 2D planar guide at a location that is based on at least one of a position or an orientation of the orthodontic

[4] *Id.* at col. 5, l. 67 – col. 6, l. 5.
[5] *Id.* at col. 6, ll. 6–9.
[6] *Id.* at col. 18, ll. 6–19.
[7] *Id.* at col. 6, ll. 23–27.

appliance within the 3D environment. Fujita appears to disclose a contradictory method. As discussed above, in Fujita, the location of the object disclosed by Fujita (which the Office Action appeared to propose replacing with an orthodontic appliance) is based on movement of the rectangular parallelepiped (a plurality of "planar guides" according to the Office Action). Thus, even if a side of the rectangular parallelepiped disclosed by Fujita may reasonably be characterized as a 2D planar guide and the bracket disclosed by Chapoulaud may replace the solid object disclosed by Fujita, assertions with which Applicant does not necessarily agree, modifying Chapoulaud in view of Fujita would fail to include, *inter alia*, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering a planar guide at a location that is based on at least one of a position or an orientation of the orthodontic appliance within the 3D environment, as required by Applicant's claim 1.

The 2D planar guide recited in Applicant's claim 1 provides a visual aid to a practitioner in a placement of an orthodontic appliance relative to the tooth of the dental arch because, e.g., as a practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, the position and/or orientation of the planar guide may change. For example, as discussed in Applicant's disclosure, a system can automatically move planar guides as a practitioner moves a bracket with respect to a tooth within a 3D environment, such that the planar guides provide a good visual indication of a position of a bracket relative to a tooth on which the bracket is being placed.[8] In contrast to the requirements of Applicant's claim 1, in Fujita, the rectangular parallelepiped is moved independently of the object it circumscribes, such that the rectangular parallelepiped would not provide a visual aid to a practitioner in a placement of an orthodontic appliance relative to the tooth of the dental arch within a 3D environment. Instead, the rectangular parallelepiped is used to indirectly move the object.

Independent claim 4 is directed to a method that comprises displaying, via a user interface of a computing device, a 3D digital representation of a tooth of a dental arch within a 3D environment, positioning an orthodontic appliance at a position within the 3D environment in response to input from a practitioner, and, while displaying the digital representation of the tooth of the dental arch, displaying, via the user interface of a computing device, a 2D planar guide within the 3D environment as a visual aid to the practitioner in adjusting a placement of the orthodontic appliance relative to the tooth of the dental arch within the 3D environment, where

[8] Applicant's disclosure, paragraph [0008].

the two-dimensional planar guide is displayed separately from the digital representation of the tooth. Claim 4 specifies that displaying the planar guide comprises rendering the planar guide at a location within the 3D environment that is based on the position of the orthodontic appliance, receiving input from the practitioner moving the placement of the orthodontic appliance with respect to the tooth within the 3D environment, and automatically moving the planar guide within the 3D environment as the practitioner moves the orthodontic appliance with respect to the tooth within the 3D environment. For at least the reasons discussed above with respect to independent claim 1, independent claim 4 is patentable over Chapoulaud in view of Fujita. For example, as discussed above, neither Chapoulaud nor Fujita discloses or suggests a method that comprises automatically moving a planar guide within the 3D environment as a practitioner moves an orthodontic appliance with respect to a tooth within the 3D environment.

For at least the reasons discussed above with respect to independent claim 1, Chapoulaud in view of Fujita fails to disclose or suggest the system of Applicant's claim 39. For example, Chapoulaud in view of Fujita fails to disclose or suggest a rendering engine that, as the practitioner moves an orthodontic appliance relative to a tooth within a 3D environment, renders a planar guide at a location based on at least one of a position or an orientation of the orthodontic appliance within the 3D environment, as required by Applicant's independent claim 39.

In addition, for at least the reasons discussed above with respect to independent claim 1, Chapoulaud in view of Fujita also fails to disclose or suggest each and every limitation of independent claim 75, such as a non-transitory computer-readable medium comprising instructions for causing a programmable processor to display a planar guide by, as the practitioner moves an orthodontic appliance relative to a tooth within a 3D environment, rendering the planar guide at a location based on a position of the orthodontic appliance within the 3D environment.

Dependent Claims

Claims 2, 3, 5–38, 40–74, and 76–86 depend from one of independent claims 1, 4, 39, and 75, and are patentable over the cited references for at least the reasons given above with respect to the independent claims. Claims 2, 3, 5–38, 40–74, and 76–86 recite additional features that are neither disclosed nor suggested by neither Chapoulaud nor Fujita or any of the other cited references. Kopelman fails to overcome the fundamental deficiencies in Chapoulaud and

Fujita described above with respect to claim 1. Applicant addresses some of the dependent claims below for purposes of illustration.

The Office Action relied on an assertion that "the adjusting the level of transparency of 3D virtual objects is well known in the art"[9] to support the rejection of claims 12, 15, 16, and 51. Applicant respectfully requests that the Examiner provide documentary evidence to support the assertion of knowledge in the art. Reliance on assertions of knowledge in the art are not appropriate without citing a prior art reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known. Moreover, in this case, the Examiner appears to be relying on assertions of technical facts or specific knowledge of the prior art, which must always be supported by citation to some reference work recognized as standard in the pertinent art.[10]

Claim 20, as amended, recites a method that comprises storing planar guide data with a computing device, wherein the planar guide data specifies a plurality of types of planar guides, receiving input from the practitioner enabling the display of at least one or more the types of planar guides, and displaying the planar guide via the user interface in accordance with the selected one or more types of planar guides. As provided in 37 C.F.R. § 1.104(c)(2), the Examiner must designate the particular part of a cited reference as nearly as practicable. However, with respect to claim 20, 56, as well as many of the claims, the Examiner has failed to do so. Clarification of the rejection of the claims is respectfully requested.

Neither Chapoulaud nor Fujita discloses or suggests the method of claim 20. Fujita only discloses displaying a rectangular parallelepiped that circumscribes an object. For example, FIG. 16 of Fujita, which the Office Action asserted discloses displaying a planar guide, only refers to displaying a "contour of circumscribed rectangular parallelepiped of solid." Thus, even if each face of the rectangular parallelepiped may reasonably be characterized as a 2D planar guide, an assertion with which Applicant does not agree, Fujita fails to disclose or suggest storing planar guide data that specifies a plurality of types of planar guides or receiving input from a practitioner enabling the display of at least one or more the types of planar guides, and displaying the planar guide via the user interface in accordance with the selected one or more types of planar guides. For example, Fujita does not disclose that a user can selectively display

[9] Office Action dated November 5, 2010, page 4, item 8.
[10] *See* MPEP 2144.03, *citing In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970).

faces of the rectangular parallelepiped. Thus, Chapoulaud in view of Fujita fails to disclose or suggest each and every element of Applicant's claim 20.

For at least the reasons discussed with respect to claim 20, Chapoulaud in view of Fujita fails to disclose or suggest each and every element of Applicant's claim 56.

Claim 26 specifies that the method of claim 1 includes automatically scaling the planar guide within the 3D environment to size the planar guide based on one or more dimensions of the tooth of the dental arch. With respect to claim 26, the Office Action stated asserted that column 19, lines 26-31 of Fujita discloses the method of claim 26. Applicant respectfully disagrees. At column 19, lines 26-31, Fujita discloses a technique for enlarging or reducing a solid object. Fujita does not disclose or suggest scaling a face of the rectangular parallelepiped (characterized as a "planar guide" in the Office Action) to size the face based on one or more dimensions of a tooth of a dental arch. Indeed, Fujita does not disclose a tooth of a dental arch. Moreover, Applicant notes that the Office Action appeared to propose replacing the solid object disclosed by Fujita with an orthodontic appliance disclosed by Chapoulaud. Therefore, any relationship between the size of the rectangular parallelepiped and the solid object disclosed by Fujita is unrelated to establishing that Fujita discloses scaling the planar guide within the 3D environment to size the planar guide based on one or more dimensions of a tooth of a dental arch.

With respect to claims 31, 32, 67, and 68, the Office Action asserted that even though Chapoulaud and Fujita fail to "explicitly teach storing statistical normal distances for the dimensions of teeth," "it would have been obvious to one having ordinary skill in the art . . . to store and utilize statically [sic] normal teeth sizes in order to allow the device to minimize the amount of information that must be manual [sic] entered into the system."[11] This assertion is insufficient to establish a *prima facie* case of obviousness with respect to claims 31, 32, 67, and 68.

As an initial matter, Applicant notes that claims 31, 32, 67, and 68 do not explicitly recite statistically normal teeth sizes. Furthermore, the Office Action failed to identify why such "teeth sizes" would even be desirable in the systems disclosed by Chapoulaud and Fujita. For example, Fujita fails to relate to teeth in any way. The Office Action likewise failed to identify why one having ordinary skill in the art would have even modified Chapoulaud to include "teeth sizes" in the first place. The Office Action's assertion that "it would have been obvious to one having

[11] Office Action dated November 5, 2010, pages 5 and 6, item 10.

ordinary skill in the art . . . to store and utilize statically [sic] normal teeth sizes in order to allow the device to minimize the amount of information that must be manual [sic] entered into the system"[12] is insufficient and fails to address the basic modification to Chapoulaud in view of Fujita required to arrive at the methods and systems of claims 31, 32, 67, and 68.

Claim 85 depends from claim 1 and specifies that the planar guide comprises an occlusal planar guide, and displaying a planar guide further comprises rendering the occlusal planar guide to penetrate an occlusal surface of the digital representation of the tooth. The Office Action asserted that the top face of the parallelepiped disclosed by Fujita is an occlusal planar guide in accordance with Applicant's claim 85.[13] Applicant respectfully disagrees that Fujita discloses or even suggests that the top surface of the parallelepiped disclosed by Fujita penetrates an occlusal surface of a digital representation of the tooth. Fujita discloses that the rectangular parallelepiped circumscribes an object, and the Office Action appeared to assert that the parallelepiped can be used to circumscribe the bracket disclosed by Chapoulaud. Even if Chapoulaud was modified such that it included a rectangular parallelepiped that outlines the bracket, there is no indication that the top face of the rectangular parallelepiped would penetrate an occlusal surface of a digital representation of a tooth. Based on the relative size of the bracket and teeth disclosed by Chapoulaud, e.g., in FIG. 5F, a rectangular parallelepiped that outlined the bracket would not appear to penetrate an occlusal surface of the tooth.

Claim 86 depends from claim 1 and specifies that a planar guide comprises a distal planar guide, and displaying a planar guide further comprises rendering the distal planar guide to penetrate a distal edge of the digital representation of the tooth. Fujita fails to disclose or suggest the distal planar guide recited in claim 86. The Office Action failed to provide any details regarding the rejection of claim 86, such as how any face of the rectangular parallelepiped disclosed by Fujita would penetrate a distal edge of the digital representation of the tooth if a method disclosed by Chapoulaud was modified to include the rectangular parallelepiped. Even if Chapoulaud was modified such that it included a rectangular parallelepiped that outlines the bracket, there is no indication that any face of the rectangular parallelepiped would penetrate a distal edge of a digital representation of a tooth. Indeed, based on the relative size of the bracket

[12] *Id.* at pages 5 and 6, item 10.
[13] *Id.* at page 4, item 7.

and teeth disclosed by Chapoulaud, e.g., in FIG. 5F, a rectangular parallelepiped that outlined the bracket would not appear to penetrate a distal edge of a digital representation of a tooth.

For at least these reasons, the Examiner has failed to establish a *prima facie* case for non-patentability of Applicant's claims 1–86 under 35 U.S.C. § 103(a). Reconsideration and withdrawal of the rejection of the claims are respectfully requested.

New Claims

Applicant has added claims 87 and 88 to the pending application. The applied references fail to disclose or suggest the inventions defined by Applicant's new claims, and there would have been no apparent reason for modification to arrive at the claimed inventions. No new matter has been added by the new claims. Support for claims 87 and 88 can be found throughout Applicant's disclosure, such as at paragraphs [0032] and [0047] and FIG. 7.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. In view of the clear distinctions identified above between the current claims and the applied art, Applicant reserves further comment at this time regarding any other features of the independent or dependent claims. However, Applicant does not necessarily admit or acquiesce in any of the rejections or the Office Action's interpretations of the applied references. Applicant reserves the right to present additional arguments with respect to any of the independent or dependent claims.

Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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